WHAT IS CLAIMED IS:

1. A process for the isomerization of a feed mixture of xylenes and ethylbenzene comprising contacting the feed mixture in the presence of hydrogen in an isomerization zone with a catalyst comprising about 0.1 to about 2 wt-% of a platinum-group component calculated on an elemental basis, about 0.01 to about 5 wt-% of a Group IVA (IUPAC 14) component calculated on an elemental basis, about 1 to about 90 wt-% of a MTW-type zeolite component having a silica-to-alumina mole ratio of about 45 or less, and an inorganic-oxide binder component at isomerization conditions comprising a temperature of from about 300° to 500° C, a pressure of from about 1 to 50 atmospheres, a liquid hourly space velocity of from about 0.5 to 10 hr^{-1} and a hydrogen-to-hydrocarbon mole ratio of from about 0.5:1 to 25:1 to obtain an isomerized product comprising a higher proportion of xylenes than in the feed mixture with a C_8 aromatics ring loss relative to the feed mixture no more than about 4 mol-%.

2. The process of claim 1 wherein the zeolite silica to alumina ratio is in the range from about 20 to about 40.

3. The process of claim 1 wherein the MTW-type zeolite is a substantially mordenite-free MTW-type zeolite component.

4. The process of claim 3 wherein the substantially mordenite-free MTW-type zeolite component comprises less than about 10 wt-% mordenite.

5. The process of claim 1 further comprising recovery of para-xylene by selective adsorption from the isomerized product.

6. The process of claim 1 wherein the platinum-group component is platinum.

7. The process of claim 1 wherein the Group IVA (IUPAC 14) component is tin.

8. The process of claim 1 wherein the inorganic-oxide binder component is alumina.

9. The process of claim 1 wherein the MTW-type zeolite component is present in the catalyst in an amount of about 2 wt-% to about 20 wt-%.

10. The process of claim 1 wherein the isomerized product yields benzene in an amount of less than about 0.2 wt-% of the feed mixture.

11. A process for the isomerization of a feed mixture of xylenes and ethylbenzene comprising contacting the feed mixture in the presence of hydrogen in an isomerization zone with a catalyst comprising about 0.1 to about 2 wt-% of a platinum-group component calculated on an elemental basis, about 0.01 to about 5 wt-% of a tin component calculated on an elemental basis, about 2 to about 20 wt-% of a substantially mordenite-free MTW-type zeolite component having a silica-to-alumina mole ratio of about 20 to 45, and an inorganic-oxide binder component at isomerization conditions comprising a temperature of from about 300° to 500° C, a pressure of from about 1 to 50 atmospheres, a liquid hourly space velocity of from about 0.5 to 10 hr^{-1} and a hydrogen-to-hydrocarbon mole ratio of from about 0.5:1 to 25:1 to obtain an isomerized product comprising a higher proportion of xylenes than in the feed mixture with a C_8 aromatics ring loss relative to the feed mixture of no more than about 3.5 mol-%.

12. The process of claim 11 wherein the substantially mordenite-free MTW-type zeolite component comprises less than about 10 wt-% mordenite.

13. The process of claim 11 wherein the isomerized product yields benzene in an amount of less than about 0.2 wt-% of the feed mixture

14. A catalyst for stable isomerization of ethylbenzene into xylenes with minimum C_8 ring loss, said catalyst comprising about 0.1 to about 2 wt-% of a platinum-group component calculated on an elemental basis, about 0.01 to about 5 wt-% of a Group IVA (IUPAC 14) component calculated on an elemental basis, about 1 to about 90 wt-% of a substantially mordenite-free MTW-type zeolite component having a silica-to-alumina mole ratio of about 45 or less, and a inorganic-oxide binder component.

15. The catalyst of claim 14 wherein the MTW-type zeolite component is present in an amount of about 2 wt-% to about 20 wt-%.

16. The catalyst of claim 14 wherein the MTW-type zeolite component has a silica-to-alumina ratio of about 20 to about 40.

17. The catalyst of claim 14 wherein the Group IVA (IUPAC 14) component is tin.

18. The catalyst of claim 14 wherein the inorganic-oxide binder is alumina.

19. The catalyst of claim 14 wherein the platinum-group component is platinum.

20. The process of claim 14 wherein the substantially mordenite-free MTW-type zeolite component comprises less than about 10 wt-% mordenite.